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significance the bearing of these investigations on the life conditions which preceded the Cambrian, is far-reaching, and must pave the way to a repair of our conceptions of it and gives us, too, a certain hope that unremitted diligence may bring to our distinguished protagonist of Precambrian life a sure and firm reward.

JOHN M. CLARKE

Nutritional Physiology. By PERCY G. STILES, Assistant Professor of Physiology in Simmons College; Instructor in Physiology and Personal Hygiene in the Massachusetts Institute of Technology, Boston. 12mo of 271 pages, illustrated. Philadelphia and London, W. B. Saunders Company. 1912. Cloth. \$1.25 net.

This little volume is a most welcome addition to the literature of nutrition. It is seldom that as much information of a reliable and useful kind is condensed in a publication of this size. The author well states that "the making of the book has been a study in elimination." He also states that it is intended to be used with other books and suggests the desirability of supplementary reading upon general biology, human anatomy, food chemistry and dietetics. We are informed that the keyword of the discussion is energy. The author has given us a careful and discriminating study of the best existing scientific evidence related to the physiological phases of human nutrition and he has treated his subject in language that is notably clear. His discussion is well organized and he has exercised a reasonable caution in his affirmations. Chemical formulæ and minute details have been excluded from the text and "used but sparingly in the notes," for "a certain preliminary knowledge of elementary science is assumed." The volume deals with processes rather than with chemical or physiological details. For instance, in discussing the unlikeness of the individual proteins on the basis of the "building stones" into which they may be separated, no detailed list is given of the protein cleavage products, but at the same time the general bearing of the knowledge we now have

in regard to protein cleavage and the nutritive relation of single food proteins upon the development of body proteins is clearly and fully presented. The origin of urea is discussed, but it is assumed that the student is familiar with the chemical reactions involved. In fact, we have presented to us the philosophy of nutrition minus minute chemical and physiological details. The evident intention is to give to the student a point of view and this purpose is accomplished with eminent success.

One of the characteristic features of this book is the type of illustrations used in order to make clear certain metabolic processes and nutritive relations. For instance, in dealing with the difference in the constructive value of the individual proteins, comparison is made to a house that is pulled down in order that another may be erected from its timbers. "If the second house is of an architecture entirely unlike that of the first, there will be many unavailable pieces to discard and the new building will be smaller than the old. It is not at all unlikely that the misfit fragments of building material will go into the cellar of the new house, later to be used as fuel. This is just what the body does." The structure of a molecule of food protein is also compared to type set up in a printed page. If this type is allowed to fall apart, it is a symbol of digestion and unless this is used to set up again exactly the same matter, there will be unused letters, just as in the human body protein building stones will be used for fuel purposes and not for construction unless the food proteins and the body proteins are alike in constitution. Familiar illustrations of this apt character are frequently used throughout the volume.

If any one portion of this volume is to be commended above another, it is the chapter upon the hygiene of nutrition. Though covering but twenty-three pages, this chapter has more value in its relation to practical dietetics than some whole volumes written by a less scholarly and discriminating author. In discussing nervous conditions as relating to digestion, some space is given to the treatment

of children as affecting the digestion of their food. It would be well if all parents could be made to heed the author's suggestions in regard to thoughtlessness in rebuking children at the table and the almost cruel practise of forcing them to eat what they dislike. The statements that "there is an element of hypocrisy in the attitude of parents who are selecting precisely what they please to eat while compelling little children to swallow food which repels" and "to oblige a child to finish a plateful of food against its inclination may be crass brutality" are forceful and should be heeded by those who have the care of the physical development of children.

The reader can but wish that the author had been more free in the use of cuts, for those which are given are very helpful.

W. H. JORDAN

NEW YORK AGRICULTURAL
EXPERIMENT STATION

Studies in Radioactivity. By W. H. BRAGG, M.A., F.R.S. Macmillan. 1912. Pp. x + 196. \$1.60.

Physics owes to Professor Bragg two of the most important of its recent advances. He first conceived and successfully carried out experiments on the "range" of corpuscular radiations and on the "stopping power" of different substances for these radiations. These experiments, with those on scattering, which inevitably followed, have been chiefly responsible for such additions as have recently been made to our knowledge of the internal structure of the atom. The first 10 chapters—104 pages—of the book in hand are taken up with a presentation in clear, non-mathematical language, of the present status of our knowledge of "range," "stopping power," "scattering" and "ionization" as these terms apply to the α and β particles. This material, culminating in C. T. R. Wilson's beautiful photographs of the tracks of α and β particles, probably marks the end of the conception of the positive charge of the atom as a uniform sphere of positive electrification. It seems to demand instead some sort of a Saturnian atom.

Bragg's second important contribution has consisted in the amassing of evidence for the inter-convertibility of β rays and X rays, or β rays and γ rays. This evidence is presented in the second half (pp. 104–196) of his book, which deals wholly with studies on the nature of X and γ rays. That this evidence is exceedingly convincing admits of no dispute, but that it can be successfully interpreted in terms of a neutral pair theory is more than doubtful. Indeed so rapid have been the strides made during the past year in establishing the essential identity of X rays and light that I fancy that Professor Bragg himself would today interpret all his results in terms of an ether pulse theory instead of a neutral doublet theory, but it would have to be an ether pulse theory of the J. J. Thomson sort, in which the energy remains localized in space instead of being distributed uniformly over the wave front. For a clear statement of the apparent necessity for some sort of a localization of radiant energy in the wave front the second half of Professor Bragg's book could scarcely be excelled. One might wish that the author had brought out more emphatically the parallelism between the behavior of X rays and ultraviolet light, for it is in this parallelism that the chief argument against the neutral doublet theory is found.

The book is invaluable to every student of the absorbing problem of the nature of radiant electromagnetic energy.

R. A. MILLIKAN

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BOTANICAL NOTES

POLYSTICTUS VERSICOLOR AS A FOOD PLANT

In the course of some investigations made by Professor M. R. Gilmore in August, 1912, on the knowledge and use of the indigenous plants by the Dakota nation of Indians, the economic botany of the Dakotas, he learned of the use of *Polystictus versicolor* as a human food. The Dakota name is *Chaⁿ naⁿ pa*,¹

¹ The raised n signifies a vanishing sound something like the French n.